

# Kingston Area Fish Tissue Data Summary

Aug 18, 2009

## BACKGROUND

Contaminants in streams or lakes can be at relatively low levels in the water column, yet still cause serious water quality problems. They can settle to the bottom and accumulate in sediment and not be detected by normal water sampling. For chemicals that bioaccumulate (built up to higher concentrations) in fish tissue, or biomagnify (accumulate at higher concentrations in the upper parts of the food chain, including humans), this can create a possibly undetected human health or environmental threat.

Following the December 22 ash spill at Kingston, state agencies immediately recognized this possibility. In order to monitor this potential exposure pathway, fish tissue samples were collected (or obtained from federal agencies) in both the Emory and Clinch Rivers in January through May. These samples have been analyzed and results are being provided to the public.

Here are some things to remember about these results:

1. There is an existing fishing advisory on the lower Emory and Clinch River that predates the ash spill, so there were already concerns about contaminants in this area. The public should continue to follow the advice provided in the existing advisory, which is to avoid consumption of striped bass and limit consumption of catfish and sauger. The known pollutants of concern are PCBs and mercury. For more information about the existing fishing advisory, see the TDEC website.

<http://www.tn.gov/environment/wpc/publications/advisories.pdf>

## EXECUTIVE SUMMARY:

The State of Tennessee collected and/or analyzed fish tissue samples from the Kingston area January – May of 2009. The analyses, performed by an EPA certified laboratory, were for metals associated with coal ash.

All levels of metals thus far, with the exception of two catfish samples that exceeded 0.3 parts per million of mercury, are below human health protection standards.

Selenium levels in fish are well below EPA's proposed toxicity standards for protection of fish and other aquatic life.

The public is urged to follow the existing fishing advisory on the lower Clinch River. There is no justification, at present, to modify this information.

Additional fish tissue samples have been collected and are awaiting analysis. The state will continue to monitor the levels of contaminants in fish tissue and will inform the public if current conditions change.

2. The trigger points currently used by the department in determining the need for fishing advisories are based on procedures found in state regulations which are in turn based on guidance from the Environmental Protection Agency (EPA).
3. As a quality control measure, most of these samples have been split between multiple agency laboratories. The data being reported here by TDEC are the state lab's results for these samples. Results are also expected from the Oak Ridge National Laboratory (ORNL), plus a contract laboratory for the Tennessee Valley Authority (TVA). While we have not postponed our reporting of the state's data in order to compare data with these other labs, the public should be aware that additional analyses are pending.
4. Additional fish tissue samples beyond the results reported here have been collected by TWRA, TVA, and ORNL and will be analyzed at the state laboratory. When those additional results are available, they will be reported on TDEC's Kingston website. To obtain the fish tissue results from ORNL or TVA's contract laboratory, or other researchers such as Appalachian State University, please contact those entities directly.
5. The state laboratory data sheets can be accessed at [www.tn.gov/environment/kingston/fishtissue](http://www.tn.gov/environment/kingston/fishtissue).
6. A table of just selenium and mercury fish tissue data has been included as Table 1 of this summary information.
7. The fish tissue results obtained up to now are important to document existing and preexisting conditions. However, they are not predictors of the future. The implications of the ash spill are profound and it may take months for toxicity or bioaccumulation to be documented. State and federal agencies have committed to monitor contaminant levels and if it appears that individual fish species on average exceed public health based trigger points, we will issue fish consumption advisories.

## **SAMPLE COLLECTIONS**

On January 9, 12, and 26, the Tennessee Wildlife Resources Agency (TWRA) staff collected fish upstream and downstream of the ash pile and also on the Clinch River. Fish collected included largemouth bass, spotted bass, channel catfish and blue catfish. These samples were run as individual fillet (muscle) samples.

On February 12, the TWRA staff returned to the Emory, just downstream of the ash spill and collected fish again. On February 25 Largemouth bass and channel catfish were collected.

On March 11, TVA field biologists provided TDEC with largemouth bass and redear sunfish collected near the ash pile on the Emory. These fish were composited as two wholebody samples.

On April 1, ORNL and TVA field staff provided largemouth bass and channel catfish tissue samples to TDEC. On April 24, ORNL and TVA staff collected channel catfish. Black crappie tissue samples were collected by TWRA staff on April 9, 22, 29, and May 5.

## RESULTS

These fish samples were analyzed for the full suite of metals, including those associated with the ash pile. The results for selenium and mercury, two contaminants of special concern are summarized below.

**Selenium.** One of the issues surrounding the potential effects of the ash spill on the environment has been the metal selenium. Selenium is a nutrient essential to the health of both people and animals, but can be toxic at higher levels. Some researchers have suggested that fish in the Kingston area had selenium concentrations near toxic levels even before the ash spill. They have expressed concern that any additional selenium possibly released by the removal of ash from the river will cause the loss of the fishery.

EPA's current draft guidance for selenium toxicity in fish is 7.91 parts per million as a wholebody result measured as a dry weight concentration. (Fillet or muscle samples are considered to have about the same selenium concentration as the wholebody sample, since much of a fish is muscle tissue.) Compared to the EPA draft guidance number, the fish tissue data compiled in Table 1 do not appear to indicate either a preexisting selenium toxicity problem in the Emory River, or a current one. Selenium levels in the river will be watched closely as dredging continues.

Regarding the human health implications of the selenium, according to EPA's guidance, the existing concentrations would not be of concern to recreational or subsistence fishermen, even if they ate Emory River fish every day.

**Mercury.** The department has historically been concerned about mercury levels in Clinch and Emory fish and water, an issue that predates the ash spill. Mercury has been detected in area river water samples. The Clinch River was already on the state's 303(d) List due to mercury and the Emory River has a preexisting mercury fish tissue advisory from mile 12.4 to mile 24.8, an area upstream of the ash spill area.

However, the fish samples collected this winter and spring are on average below 0.3 parts per million, the current public consumption advisory trigger point suggested by EPA. Thus, at this time, there does not appear to be justification to revise the existing advisory on the basis of mercury. (Two catfish samples had over 0.3 parts per million of mercury, but there is already an advisory to limit consumption of catfish in this area.)

**TABLE 1**  
**Mercury and Selenium Fish Tissue Data from Emory and Clinch Rivers**

Data expressed as mg/kg wet weight, unless indicated otherwise.

All samples are fillets unless indicated otherwise

**Clinch River mile 9.5, 8.0, and 2.1**

Station ID	Species	Length Inches	Wt Lbs	Mercury Mg/Kg Wet Wt.	Selenium Mg/Kg Wet Wt.	Selenium Mg/Kg dry wt*	Date Collected
<b>CLINC009.5RO</b>	LMB #1	12.5	0.96	0.15	0.41J	1.91	1/9/09
	LMB #2	11.6	0.72	0.25	0.47J	2.18	1/9/09
	LMB #3	13.9	1.3	0.06	0.36J	1.67	1/9/09
	LMB #4	12.5	0.9	0.05	0.47J	2.18	1/9/09
	LMB #5	14.0	1.27	0.13	0.66	3.07	1/12/09
	Channel Cat #1	15.4	1.2	0.09	0.13U	NA	1/9/09
	Channel Cat #2	16.4	1.39	0.07	0.13U	NA	1/9/09
	Channel Cat #3	12.9	0.41	0.10	0.18J	0.84	1/12/09
	Channel Cat #4	19.1	2.3	0.17	0.21J	0.98	1/12/09
	Blue Cat #1	18.7	2.16	0.17	0.32J	1.49	1/9/09
	Blue Cat #2	18.8	2.16	0.29	0.14J	0.65	1/9/09
	Blue Cat #3	18.3	1.7	0.13	0.13U	NA	1/9/09
	Blue Cat #4	15.5	1.2	0.09	0.20J	0.93	1/9/09
	Blue Cat #5	15.6	1.02	0.12	0.25J	1.16	1/9/09
<b>CLINC008.0RO</b>	Black Crappie #1	13.2	1.25	0.04	0.34J	1.58	5/5/09
	Black Crappie #2	11.9	1.06	0.01J	0.41J	1.91	5/5/09
	Black Crappie #3	12.0	1.03	0.19	0.65	3.02	5/5/09
	Black Crappie #4	12.0	1.03	0.05	0.32J	1.49	5/5/09
	Black Crappie #5	9.5	0.5	0.05	0.54	2.51	5/5/09
<b>CLINC001.2RO</b>	LMB #1	14.2	1.35	0.06	0.5J	2.32	1/9/09
	LMB #2	13.1	1.36	0.07	0.34J	1.58	1/9/09
	LMB #3	12.8	1.06	0.03	0.33J	1.53	1/9/09
	LMB #4	12.5	1.01	0.02	0.52	2.42	1/12/09
	Spotted Bass	16.6	2.4	0.10	0.34J	1.58	1/12/09
	Channel Cat #1	14.7	1.36	0.06	0.39J	1.81	1/9/09
	Channel Cat #2	17.6	2.18	0.37	0.15J	0.70	1/9/09
	Channel Cat #3	14.7	0.96	0.06	0.35J	1.63	1/12/09
	Channel Cat #4	14.4	0.8	0.07	0.54	2.51	1/12/09
	Channel Cat #5	15.9	1.1	0.04	0.42J	1.95	1/12/09

LMB = Large Mouth Bass

U = Undetected

J = Estimated value between MQL (Method Quantitation Level)  
and MDL (Method Detection Level)

\*Factor used to convert selenium from wet weight to dry weight was 4.65, per EPA guidance. (Assuming average moisture content of 78.5%.)

**TABLE 1 (cont.)**  
**Mercury and Selenium Fish Tissue Data from Emory and Clinch Rivers**

Data expressed as mg/kg wet weight, unless indicated otherwise.

All samples are fillets unless indicated otherwise

**Emory River mile 8.0 and 3.0**

Station ID	Species	Length Inches	Wt Lbs	Mercury Mg/Kg Wet Wt.	Selenium Mg/Kg Wet Wt.	Selenium Mg/Kg dry wt*	Date Collected
<b>EMORY008.0RO</b>	LMB	12.1	0.67	0.18	0.48J	2.23	2/25/09
	Channel Cat #1	15.6	1.1	0.11	0.14J	0.65	1/26/09
	Channel Cat #2	17.0	1.79	0.11	0.24J	1.12	1/26/09
	Channel Cat #3	18.3	2.53	0.29	0.13U	NA	2/25/09
	LMB 13707 (TVA/ORNL)	17.3	2.8	0.17	0.36J	1.67	4/1/09
	LMB 13708 (TVA/ORNL)	12.0	0.7	0.18	0.31J	1.44	4/1/09
	LMB 13709 (TVA/ORNL)	15.0	1.5	0.22	0.31J	1.44	4/1/09
	LMB 13710 (TVA/ORNL)	14.4	1.6	0.17	0.44J	2.05	4/1/09
	LMB 13711 (TVA/ORNL)	18.0	3.3	0.20	0.33J	1.53	4/1/09
	Channel Cat 13718 (TVA/ORNL)	15.7	1.2	0.05	0.24J	1.12	4/1/09
	Channel Cat 13719 (TVA/ORNL)	16.7	1.4	0.05	0.23J	1.07	4/1/09
	Channel Cat 13720 (TVA/ORNL)	20.1	2.6	0.36	0.13U	NA	4/1/09
	Black Crappie #1	11.1	0.88	0.03	0.68	3.16	4/24/09
	Black Crappie #2	11.7	1.12	0.04	0.69	3.21	4/24/09
	Black Crappie #3	10.7	0.75	0.04	0.51	2.37	4/24/09
	Black Crappie #4	12.2	1.10	0.06	0.43J	2.0	4/24/09
	Black Crappie #5	11.0	0.75	0.06	0.46J	2.14	4/24/09
<b>EMORY003.0RO</b>	LMB (Whole Body) TDEC	13.1 (ave.)	1.1 (ave)	0.09	0.97	4.51	3/11/09
	Redear Sunfish (Whole Body) TDEC	7.8 (ave.)	0.3 (ave)	0.04	1.1	5.12	3/11/09

LMB = Large Mouth Bass

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J = Estimated value between MQL (Method Quantitation Level)  
and MDL (Method Detection Level)

\*Factor used to convert selenium from wet weight to dry weight was 4.65, per EPA guidance. (Assuming average moisture content of 78.5%.

**TABLE 1 (cont.)**  
**Mercury and Selenium Fish Tissue Data from Emory and Clinch Rivers**

Data expressed as mg/kg wet weight, unless indicated otherwise.

All samples are fillets unless indicated otherwise

**Emory River mile 0.5, 0.9, and 2.1**

Station ID	Species	Length Inches	Wt Lbs	Mercury Mg/Kg Wet Wt.	Selenium Mg/Kg Wet Wt.	Selenium Mg/Kg dry wt*	Date Collected
<b>EMORY000.5RO</b>	LMB #1	14.8	1.73	0.16	0.43J	2.00	1/9/09
	LMB #2	13.1	1.1	0.07	0.74	3.44	1/9/09
	LMB #3	12.1	0.86	0.04	0.55	2.56	1/9/09
	LMB #4	11.5	0.69	0.03	0.49J	2.28	1/9/09
	LMB #5	14.0	1.27	0.05	0.60	2.79	1/12/09
	LMB #6	11.9	0.73	0.05	0.50	2.32	2/12/09
	LMB #7	11.3	0.6	0.05	0.81	3.77	2/12/09
	LMB #8	14.6	1.5	0.15	0.40J	1.86	2/12/09
	Channel Cat #1	18.0	2.32	0.07	0.18J	0.84	1/9/09
	Channel Cat #2	16.0	1.42	0.11	0.13U	NA	1/9/09
	Channel Cat #3	14.1	0.94	0.13	0.13U	NA	1/9/09
	Channel Cat #4	19.1	2.31	0.13	0.34J	1.58	1/12/09
	Blue Cat #1	16.5	1.64	0.08	0.29J	1.35	1/9/09
	Blue Cat #2	15.0	1.2	0.08	0.23J	1.07	1/9/09
	Blue Cat #3	20.2	2.92	0.11	0.30J	1.40	1/9/09
	Blue Cat #4	20.0	3.18	0.11	0.33J	1.53	1/9/09
	Blue Cat #5	16.2	1.42	0.07	0.25J	1.16	1/9/09
<b>EMORY000.9RO</b>	Black Crappie #1	11.1	0.81	0.06	0.60	2.79	4/9/09
	Black Crappie #2	9.7	0.62	0.03	0.45J	2.09	4/9/09
	Black Crappie #3	9.6	0.62	0.03	0.64	2.98	4/9/09
	Black Crappie #4	9.7	0.56	0.02	0.65	3.02	4/9/09
	Black Crappie #5	8.7	0.44	0.03	0.40J	1.86	4/9/09
<b>EMORY002.1RO</b>	Black Crappie #1	11.3	0.87	0.03	0.73	3.39	4/29/09
	Black Crappie #2	10.4	0.75	0.02	0.75	3.49	4/29/09
	Black Crappie #3	9.0	0.50	0.04	0.60	2.79	4/29/09
	Black Crappie #4	8.8	0.44	0.04	0.75	3.49	4/29/09
	Black Crappie #5	8.6	0.38	0.03	0.69	3.21	4/29/09

LMB = Large Mouth Bass

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and MDL (Method Detection Level)

\*Factor used to convert selenium from wet weight to dry weight was 4.65, per EPA guidance. (Assuming average moisture content of 78.5%.)